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**A Census and Recommendations for
Management for Western Blue Flag (*Iris
missouriensis*) in Alberta**



Alberta Species at Risk Report No. 38

A Census and Recommendations for Management for Western Blue Flag (*Iris missouriensis*) in Alberta

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Executive Summary

In Canada, naturally occurring populations of western blue flag (*Iris missouriensis*) are restricted to the southwestern corner of Alberta. Because of its limited range and abundance, it was recently listed as threatened under the Alberta Wildlife Act. Earlier status reports indicated that the western blue flag population was limited and declining; however, new sites inventoried in 2000 and 2001 have substantially increased stem counts. Nevertheless, western blue flag must still be considered vulnerable because of its limited range, its strict habitat requirements, and because it occurs mainly on private land.

With few exceptions, western blue flag habitat is limited to the transitional zone between wet meadows and dry upland sites. Western blue flag seems to benefit from light to moderate grazing regimes because that has been the long-term management method used at the three large sites remaining. It has not been found in riparian zones or where overgrazing has occurred.

In 2001, a committee was formed to develop a management plan aimed at conserving existing populations of western blue flag. All landowners with western blue flag on their property were contacted and asked to participate on the committee. Range management plans were offered as an incentive. Of six contacted, four agreed to participate in the management planning process.

In 2000 and 2001 all known naturally occurring western blue flag sites were inventoried. Results contained in this report indicate there are eleven naturally occurring sites of western blue flag in Alberta (and Canada) with a total of 14757 stems. In this report, information for each site is described and management recommendations are provided. Conserving western blue flag habitat through landowner cooperation is critical to maintaining western blue flag populations in Alberta.

1.0 Introduction

Western blue flag is a long-lived perennial, occurring at the extreme northern limit of its range in southwestern Alberta. All known sites of naturally-occurring western blue flag in Canada are located south of Cardston, within ten kilometers of the United States border along an east/west line of about 30 kilometers. The Alberta Status Report for western blue flag (Gould 1999) listed six sites with naturally-occurring western blue flag in Alberta, but searches carried out in 2000 confirmed only four of these six (Ernst, 2001). The 2000 inventory also resulted in two new sites being discovered and inventoried (Ernst, 2000). One further population was discovered in 2000 but permission to inventory the site was not received until 2001. In the fall of 2001 another site was reported and inventoried. For the purposes of this report, a "site" and a "population" are synonymous and have more to do with jurisdiction or ownership of the land where they occur rather than biological considerations.

The Alberta Natural Heritage Information Center (ANHIC) lists western blue flag as an S1/G5, meaning that the plant is secure on a global basis but there are five or fewer occurrences in Alberta. The COSEWIC listing for the species is "Threatened". Western blue flag has been approved by the Alberta Minister of Sustainable Resource Development to be legislated as a "Threatened Species" in the Alberta Wildlife Act.

For more detailed information on the biology of western blue flag see Wallis and Bradley (1989), Cornish (1998), and Gould (1999).

1.1 Objectives

The objectives of the 2001 project were:

- ❑ Census newly described naturally-occurring populations of western blue flag in Alberta.
- ❑ Continue monitoring the Police Outpost Provincial Park (POPP) population of western blue flag.
- ❑ Provide management recommendations for western blue flag in Alberta.

2.0 Methods

To inventory smaller sites such as at POPP, the perimeter of the site and major western blue flag clumps were first marked with flagging. The site was then walked in a systematic fashion and all western blue flag stems were counted. Flowering stems were counted separately. On larger sites such as the Boundary site, the methods used were similar (i.e. the perimeter and major clumps were flagged) but transects were walked at three meter intervals and all plants observed each side of transects were counted and recorded. A separate record was kept for flowering stems.

In 2001, stem counts were done at three locations: the two POPP sites and the site discovered in 2000 now known as the Boundary site. In November of 2001, estimates were done at another new site now known as the Carway east site.

3.0 Results of 2001 Census

POPP: At POPP west, stem counts and flowering stalks were down slightly from a total of 219 (14 flowering) in 2000 to a total of 203 (8 flowering) in 2001. Stem counts at this site have declined since 1989 (Table 1). At POPP east, the stem count was up slightly from a total of 175 (14 flowering) in 2000 to a total of 177 (26 flowering) in 2001. The POPP east population (discovered in 2000) is more robust than the west site if the number of flowering stems is an indicator.

Boundary Site: Three sites, each separated by about 500 m make up the Boundary population. This site was newly discovered in 2000 and first inventoried in 2001. A total of 4996 stems (547 flowering) were recorded, effectively increasing the Alberta western blue flag total stem count by more than a third.

Carway East: The landowner reported this site in 2001 and stem estimates were done during November of 2001. Western blue flag was limited to a few scattered clumps spread over an area of about 50 ha. Because of the lateness of the season, stem counts were not possible but were estimated to be about 200. A survey during the growing season will provide a more accurate count of western blue flag stems and may reveal additional clumps.

Carway North (2001 site): This site is separated from the main Carway North population by about a kilometer and was first reported in 2001. An inventory done in November (2001) revealed several robust clumps of western blue flag scattered along a southeast facing slope containing an estimated 300 stems with many persistent seed pods. Although the slope appears to be quite dry, the landowner reports the presence of sub-surface water, evidenced by a spring just east of the site.

Other Sites: Other known sites were surveyed in 2000, results are reported in the 2000 project report (Ernst 2001) and in Table 1.

Cumulative Results for 2000 and 2001:

In 1989, the population of western blue flag was estimated at 7500 stems. The 2001 population is estimated at 14757 stems. Eleven sites have been confirmed and inventoried during 2000 and 2001. There are, therefore, eleven known naturally - occurring sites of western blue flag in Alberta and Canada. Three of these sites have large stem counts ranging from 2000 – 6000 stems; the remaining sites are small with stem counts less than 600. All sites are on private land with the exception of the POPP population. Table 1 summarizes results of the 2001 inventory, compares with past inventories, and provides a revised estimate of western blue flag stem counts.

Table 1: A comparison of stem count and flowering stalks for the years 1989, 1998, 2000 and 2001.

Site	Date	Total Stems	Flowering Stalks
POPP west	1989	650	6
	1998	325	1
	2000	219	14
	2001	203	8
POPP east	1989	n/a*	n/a
	1998	n/a	n/a
	2000	175	14
	2001	177	26
Harrisville*	1989	1500	several hundred
	1998	n/a	n/a
	2000	2091	304 (mostly pods)
Carway North a*	1989	5000	high proportion
	1998	n/a	n/a
	2000	6049	256
Carway North b ***	2001	300 (est.)	30 (est.)
Carway South**	1989	N/A	25-30
	2000	570	42
Carway East***	2001	200 (est.)	n/a
Whiskey Gap*	1989	203	0
	1998	111	2
	2000	171	2
Boundary***	2001	4996	547
1989 western blue flag population estimate = 7500 stems. 2000 western blue flag population estimate = 9275 stems. 2001 western blue flag population estimate = 14757 stems.			

* not inventoried in 2001, previously known as Beazer

** not inventoried prior to 2000

*** first inventoried in 2001

n/a information not available or site not inventoried that year

3.1 General Site Conditions

There are now eleven confirmed sites of western blue flag in Alberta. Confirmed locations are: Carway North a and b, Carway South, Carway East, POPP East, POPP West, Boundary (3 sites), Beazer, and Whiskey Gap. All these locations are south of Cardston, and specific locations are not provided in this report for reasons of confidentiality. The western blue flag populations at five of the sites are large and robust; the other six are small and limited. The robust populations of western blue flag are not confined to a specific site but instead are part of a larger area with scattered clumps and single plants spread out over several hectares.

In general, western blue flag occurs mainly in the transition zone between ephemeral wetlands and upland sites; however, during the 2000 inventory there were exceptions noted (Ernst 2001). The plant was observed growing in relatively dry upland communities as well as understory in willow (*Salix spp.*) communities. This makes it difficult to make generalizations as to the species strict habitat niche. Western blue flag was not found in areas that remain wet throughout the summer, but was never far from depressions that receive extra moisture at least during the spring snowmelt. The species clearly requires moist conditions early in the growing season. In 2000, there was no visible water near any of the western blue flag sites except at POPP.

Western blue flag occurs in the Black Chernozem soil zone of Alberta. Because no information has been found indicating that the relationship between soil characteristics and western blue flag has ever been studied or is important; it is unknown if any such relationship exists.

3.2 Site Specific Conditions

POPP West

This is a very small site (about 30 m²) with a slight northerly aspect located near Police Lake. It is not known how much lake levels fluctuate from year to year but it is known that in 1995, lake levels rose substantially and may have flooded out a portion of this population. Cornish (1998) noted that previous flooding, a high water table, and competition from smooth brome (*Bromus inermis*) are reducing the density and vigor of western blue flag at this site. In 2000, an extremely heavy litter build-up and encroachment from willows was observed at this site and it is thought these factors may be having a negative effect on this population.

POPP east

This site was first discovered in 2000 (Ernst 2001). It is larger and much drier than the POPP west site and is located about 200m east of the POPP west site on a dry southwest - facing slope. All of the western blue flag plants are located well away from any saturated soil and many are located on drier upland sites. Two clumps are located under willow canopies. Smooth brome is a serious invader on this site; blue grass (*Poa pratensis*) and Timothy (*Phleum pratense*) are also present.

Harrisville Site (previously "Beazer")

This is a large site on a north-facing slope stretching for about 400m along the south side of an ephemeral drainage. Many of the western blue flag clumps are randomly located on the drier upland sites and seem to be very competitive, even in relatively dense vegetation. Dominant species on this site are non-native grass species; Kentucky blue grass is the most common, but brome, Timothy, orchard grass (*Dactylis glomerata*) and native sedges (*Carex spp.*) are also present.

This site had a high ratio of flowering/fruiting stems. Up until recently, this site was lightly grazed year around by horses. Cattle now graze it for a few weeks each season starting around the end of July. It is too soon to measure what impact the current grazing regime is having.

Carway North Sites

The Carway a site is located about 6 km north of Carway and has the largest known population of western blue flag in Alberta (more than 6000 stems). Habitat features at this site show a great deal of variation ranging from bottomlands dominated by sedges and hairgrass (*Deschampsia cespitosa*) to drier upland sites where rough fescue (*Festuca scabrella*) is present to understory in willow thickets. The majority of the population shows a strong but non-obligatory association with willows. This population has been fall and winter grazed for at least the past several decades and judging by the large and apparently thriving population of western blue flag, it seems to have been very beneficial. Portions of the Carway North site have been hayed periodically over the years without any apparent harm to western blue flag. Another site, Carway North b, is separated

from the main Carway North population. It was first reported and inventoried during the fall of 2001.

Carway South Site

The western blue flag are adjacent to a recently constructed dugout. The site has a high proportion of non-native grasses (cover about 40%). This population is vulnerable due to its small number of stems in a small area.

Carway East Site

First reported and inventoried in the fall of 2001, this population is made up of a few widely scattered clumps adjacent to a depression which floods during the spring. An inventory done during the growing season may reveal additional western blue flag clumps.

Whiskey Gap Site

This is a very small and apparently unique site of about 40 m² located on a southwest - facing slope. It is the only known population within the Milk River drainage. Moisture for this site is apparently derived solely from snowmelt and rainfall. The western blue flag occurs along the transition zone between hairgrass and shrubs which include rose (*Rosa sp.*), shrubby cinquefoil (*Potentilla fruticosa*), and wolf willow (*Elaeagnus commutata*). There are no willows associated with this site

The plants located among the shrubs are of normal size but those located in the grassy meadow are severely stunted, mostly around 10 cm tall. Grazing has nipped off some plant tips but it is unlikely that cattle deliberately select for western blue flag; it is more likely they inadvertently nip the plants when grazing the hairgrass. There are no robust clumps at the Whiskey Gap site- the plants occur as individuals and occasionally in a group of three or four stems. This is the only site where native grass was the dominant graminoid and where non-native grasses were not a factor.

Ample carryover and litter indicate light to moderate grazing; nevertheless, grazing seems to have impacted this site. Perhaps season of use is a factor because this site receives early spring grazing every year. Environmental conditions at this site are likely sub-optimal for western blue flag.

Boundary Site

Several factors make this site particularly valuable including the large area covered by the population (about 2 km²), the large number of stems (about 5000), and the security provided by an existing conservation easement. Most of the plants are located in the transition zone between wet meadows and drier upland sites. Because this population is spread out over a large area, competing vegetation and site conditions are highly variable. Major competing species include native and non-native grasses, sedges, and native forbs. Willow is present on some sites but is completely absent on others. Grazing is light over most of the site.

4.0 Discussion

In 2000, the search of one site where earlier reports indicated western blue flag occurred failed to find any plants. Upon further investigation, it was found that this site had never been formally

investigated by authors of previous reports, but had, nevertheless, been included in the list of blue flag occurrences for Alberta. It may be that the populations at this site has been extirpated since it was reported in 1989, or the location description may have been wrong. In 2000, one new sites was inventoried and a third (Boundary) was discovered which was subsequently inventoried in 2001. The discovery of the Boundary site will have a major impact on improving the status and security of western blue flag in Alberta. An additional private land site near Carway was reported and inventoried in fall 2001.

It is important to determine why the stem count at POPP west is in serious decline. It may be because of the high water table, because of the encroachment of graminoids and willows, because of the very heavy litter build-up or because of some other cause. The heavy litter build-up allows for moister conditions to prevail, favoring invasive non-native species such as brome grass.

4.1 Recovery Plan Process

In 2000, western blue flag (*Iris missouriensis*) was recommended by the Alberta Endangered Species Conservation Committee to the Minister of Environment for listing as a threatened species. The rationale for listing included:

- Alberta has the only naturally occurring populations of western blue flag in Canada.
- The populations are restricted to a range of less than 100 km² in southwestern Alberta.
- An apparent decline of 27% had occurred in the past ten years.

On September 12, 2001 the Minister of Sustainable Resource Development approved western blue flag for listing as a Threatened species in Alberta. The Alberta Wildlife Act requires provincial recovery plans for Threatened species within two years. In order to develop a recovery plan, a committee made up of interested and affected groups and individuals was formed in October 2001. As part of the recovery process, participating landowners were provided with range management plans directed at maintaining western blue flag. The Alberta Conservation Association's Native Prairie Stewardship Program provided the resources to develop the range management plans. Of seven landowners contacted, five agreed to participate in the recovery plan process. The recovery plan should be completed by the spring of 2002.

5.0 Management Recommendations

1. Grazing seems to be an important factor in maintaining viable western blue flag populations. Grazing is beneficial to western blue flag because it removes competitive species. Eckert et al. (1973) state that western blue flag is an "increaser" species under light to moderate grazing regimes. In the Alberta populations no western blue flag plants were found on heavily grazed areas. The healthiest populations were on light to moderately grazed areas. Studies have also shown that moderate grazing levels (versus heavy) are ecologically sound and provide the best long-term economic returns (Holechek et al. 1998). Grazing systems that are ecologically and financially sound should also benefit western blue flag. Litter build-up as well as competition from other plants may be excessive and detrimental to western blue flag under very light or no grazing conditions. Season of use, stocking rate, and distribution may be more important than the system used. Fall and winter grazing may be the greatest benefit to the plants as this was the grazing regime used at two sites where there are robust

populations. Under a moderate grazing regime, no more than 40% of the current years growth should be removed.

2. The search for additional populations of western blue flag needs to continue.
3. The color brochure (Alberta Forestry, Lands and Wildlife 1991) should be distributed in the Carway area and landowners need to be requested to report any western blue flag plants found on their property.
4. Cost effective procedures need to be developed to monitor stem count trends on large sites. Frequent total stem counts on large sites are impractical because they lack precision and are difficult and time consuming. An alternative is to permanently mark robust clumps of western blue flag and inventory them every five years to determine stem count trends. Total stem counts could be done every ten years if necessary. On small sites, stem counts could be done every three years. Management would be based on trend.
5. A periodic census needs to be done of extant western blue flag populations. Frequency should be based on changes observed through monitoring procedures; however, the POPP sites should be monitored annually, the other small populations should be inventoried every three years, and the large populations should receive limited monitoring every five years with a complete census every ten years if necessary.
6. Landowners should be informed of opportunities for voluntary cooperative agreements to manage their western blue flag populations in a sustainable way.
7. There should be no cultivation or alteration of hydrological processes that would impact western blue flag.
8. Use of chemicals or other control practices that would harm western blue flag should be avoided.
9. Any haying activity should be designed for minimize impact to western blue flag.
10. Treatments should be applied at the POPP West site to try and improve conditions. Treatments could be in the form of removing competing vegetation, litter, and willows. An alternative to mimicking grazing would be to provide prescription grazing at this site. Late season grazing at the light to moderate level may be the most appropriate. Strict monitoring would be an integral part of any grazing system.
11. No management action is recommended at the POPP East site other than monitoring to determine population trends. If brome continues to increase in area and density, some control action may be required. POPP is pursuing the possibility of having a graduate student investigate the smooth brome problem. Grazing could also benefit this site as suggested for the POPP west site.

12. The vigor of the Beazer site would suggest that future management should continue in a similar fashion to past management; however, a recent change in management has occurred, but has not been evaluated.
13. The Carway North landowner should be encouraged to manage in a similar fashion as in the past, but the heavy accumulations of litter indicate that grazing may be too light. Removing 40% of the current years growth may control excessive litter build-up.
14. The Whiskey Gap landowner should be encouraged to graze this site later in the season and perhaps rest the site for one or two seasons to determine how much impact grazing is actually having. An alternative would be to fence the small western blue flag site and graze later in the season. The small area involved should not have any significant economic impact on the ranching operation.
15. There may be additional recommendations in specific range management plans being prepared for landowners with western blue flag.

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